Amendments to the Claims:
This listing of claims will replace all prior versions, and listings, of claims in the
application:

1. (currently amended) A system to deliver pump power to a remote optically pumped
amplifier (ROPA) in an optical fiber communication span, the span comprising a signal
carrying fiber with the ROPA spliced into the signal carrying fiber at a distance from
either the transmitter end for post-amplification or from the receiver end for pre-
amplification, and the ROPA being pumped by ~~energy~~optical power at a pump
wavelength λ_p carried by at least one pump delivery fiber, said at least one pump
delivery fiber having Raman properties whereby effective transmission of power at the
pump wavelength λ_p is limited by a maximum launch power at λ_p, the system
comprising for each pump delivery fiber:

    a primary pump source at wavelength λ_0, shorter than the ROPA pump
wavelength λ_p;

    means to provide substantially lower ~~energy~~power at two or more seed
wavelengths $\lambda_{s1} \dots \lambda_{sn}$, where $n \geq 2$ and $\lambda_0 < \lambda_{sn} \leq \lambda_p$, and where the ensemble of seed
wavelengths contains at least one at the ROPA pump wavelength λ_p;

    coupling means to input ~~energy~~power from the primary pump source and
~~energy~~power at the two or more seed wavelengths into said pump delivery fiber at said
transmitter end for post-amplification or at said receiver end for pre-amplification,

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wherein:

the primary pump wavelength is less than the wavelength λ_p by an amount corresponding to n Raman shifts in the delivery fiber and where the ensemble of seed wavelengths contains one in the vicinity of each intermediate wavelength λ_l, where $l = n-1$, n-2 ... 1, and denotes the number of Raman shifts in the delivery fiber between the wavelength λ_l and the ROPA pump wavelength λ_p, and

said primary pump and said means to provide substantially lower power at two or more seed wavelengths are configured to cause said ~~energy~~power from the primary pump source and ~~energy~~power at the two or more seed wavelengths coupled into said pump delivery fiber to provide ~~providing~~more power at the pump wavelength λ_p to the ROPA than would be provided by coupling the maximum input power level at the pump wavelength λ_p into said pump delivery fiber at said transmitter or receiver end.

2. (original) The system as claimed in claim 1, wherein said ROPA is a ROPA pre-amplifier and the said at least one pump delivery fiber is the signal carrying fiber linking the ROPA and said receiver end.

3. (original) The system as claimed in claim 1, wherein said ROPA is a ROPA pre-amplifier and the said at least one pump delivery fiber comprises the signal carrying fiber linking the ROPA and said receiver end and one or more dedicated pump delivery fibers.

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4. (original) The system as claimed in claim 1, wherein said ROPA is a ROPA pre-amplifier and the said at least one pump delivery fiber comprises one or more dedicated pump delivery fibers.

5. (currently amended) The system as claimed in claim 2, wherein at least one of the λ_{s1} ... λ_{sn} are selected to ~~flatten~~control the profile of the distributed Raman gain experienced by the signals due to the power at the λ_{s1} ... λ_{sn} present in the signal carrying fiber so as to limit the distributed Raman gain experienced by the signals to be below a maximum tolerable gain at which multi-path interference (MPI) transmission penalties due to double Rayleigh signal scattering would arise and thus make a greater portion of the transmission band accessible for signal transmission.

6. (original) The system as claimed in claim 1, wherein said ROPA is a ROPA pre-amplifier further comprising means to couple light from the said at least one pump delivery fiber into the ROPA amplifying fiber in a co-propagating direction with respect to the signals.

7. (currently amended) The system as claimed in claim 1, wherein said ROPA is a ROPA pre-amplifier, and said substantially lower ~~energy~~power provided at one or more of said two or more seed wavelengths is provided by depolarized laser diodes.

8. (original) The system as claimed in claim 1, wherein the said ROPA is a post-amplifier and the said at least one pump delivery fiber comprises one or more dedicated pump delivery fibers.

9. (original) The system as claimed in claim 8, further comprising means to couple light into the ROPA amplifying fiber in both a co-propagating and a counter-propagating direction with respect to the signals.

10. (currently amended) The system as claimed in claim 9, wherein the ROPA is pumped by two dedicated pump fibers PF_1 and PF_2 and wherein the ROPA pump wavelength in PF_1 is deliberately chosen to be different from, but closely spaced to, that in PF_2 and further comprising means to divide the ROPA pump ~~energy~~power delivered by PF_1 into two amounts of predetermined magnitude and means to combine one of said two amounts with the ROPA pump ~~energy~~power delivered by PF_2 prior to coupling the pump ~~energy~~power into the ROPA amplifying fiber, so as to optimize the ratio of co-propagating and counter-propagating pump power coupled into the ROPA amplifying fiber.

11. (currently amended) The system as claimed in claim 1, wherein said means to provide substantially lower ~~energy~~power at said two or more seed wavelengths $\lambda_{s1} \dots \lambda_{sn}$ includes reflection means to return into said pump delivery fiber amplified spontaneous Raman scattered radiation, originating in said pump delivery fiber due to

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the presence of high power at a wavelength one Raman shift below the particular seed wavelength.

12. (currently amended) The system as claimed in claim 1, wherein the primary pump source is an Yb fiber laser operating at a wavelength in the 1090-nm region and the number of Raman shifts n between the primary pump wavelength λ_0 and the pump wavelength λ_p equals 6 and further comprising 5 fiber Bragg grating reflectors to provide the said substantially lower ~~energy~~power at the intermediate seed wavelengths $\lambda_{si} \neq \lambda_p$.

13. (original) The system as claimed in claim 1, wherein the primary pump wavelength λ_0 and the number and position of the intermediate seed wavelengths $\lambda_{si} \neq \lambda_p$ are chosen specifically so as to avoid the water absorption peak in the pump delivery fiber.

14. (currently amended) A method for pumping remote optically-pumped fiber amplifiers (ROPAs) in fiber-optic telecommunication systems, the span comprising a signal carrying fiber with the ROPA spliced into the signal carrying fiber at a distance from either the transmitter end for post-amplification or from the receiver end for pre-amplification, and the ROPA being pumped by ~~energy~~power at a pump wavelength λ_p carried by at least one pump delivery fiber, said at least one pump delivery fiber having

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Raman properties whereby effective transmission of power at the pump wavelength λ_p is limited by a maximum launch power at λ_p, the method comprising:

selecting primary pump wavelength λ_0, shorter than the ROPA pump wavelength λ_p;

selecting two or more seed wavelengths $\lambda_{s1} \ldots \lambda_{sn}$, where $n \geq 2$ and $\lambda_0 < \lambda_{sn} \leq \lambda_p$, and where the ensemble of seed wavelengths contains at least one at the ROPA pump wavelength λ_p;

coupling ~~energy~~ power at the primary pump wavelength and at the two or more seed wavelengths into said pump delivery fiber at said transmitter end for post-amplification or at said receiver end for pre-amplification, such that cascaded Raman amplification is used to deliver pump power to the ROPA that exceeds the pump power provided by coupling the maximum input power level at the pump wavelength λ_p into said pump delivery fiber at said transmitter or receiver end.

15. (currently amended) The method as claimed in claim 14, wherein said ROPA is a ROPA pre-amplifier and said at least one pump delivery fiber includes the signal carrying fiber, further comprising selecting at least one of the $\lambda_{s1} \ldots \lambda_{sn}$ to ~~flatten~~control the profile of the distributed Raman gain experienced by the signals due to the power at the $\lambda_{s1} \ldots \lambda_{sn}$ present in the signal carrying fiber, so as to limit the distributed Raman gain experienced by the signals to be below a maximum tolerable gain at which multi-path interference (MPI) transmission penalties due to double Rayleigh signal scattering

would arise and thus make a greater portion of the transmission band accessible for
signal transmission.

16. (original) The method as claimed in claim 14, wherein said ROPA is a post-amplifier,
further comprising incorporating means to couple light into the ROPA amplifying fiber in
both a co-propagating and a counter-propagating direction with respect to the signals.

17. (currently amended) The method as claimed in claim 16, wherein said ROPA is
pumped by two dedicated pump fibers PF_1 and PF_2 and wherein the ROPA pump
wavelength in PF_1 is deliberately chosen to be different from, but closely spaced to, that
in PF_2 and further comprising incorporating means to divide the ROPA pump
~~energy~~power delivered by PF_1 into two amounts of predetermined magnitude and
means to combine one of said two amounts with the ROPA pump ~~energy~~power
delivered by PF_2 prior to coupling the pump ~~energy~~power into the ROPA amplifying
fiber, so as to optimize the ratio of co-propagating and counter-propagating pump power
coupled into the ROPA amplifying fiber.

18. (currently amended) The method as claimed in claim 14, wherein said coupling of
~~energy~~power at said two or more seed wavelengths into said pump delivery fiber
comprises using passive reflective means for coupling said ~~energy~~power at one or more
of said two or more seed wavelengths.

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19. (currently amended) The method as claimed in claim 14, further comprising selecting an Yb fiber laser operating at a wavelength in the 1090-nm region as the primary pump source and the number of Raman shifts n between the primary pump wavelength λ_0 and the pump wavelength λ_p to equal 6 and further comprising using 5 fiber Bragg grating reflectors to couple said ~~energy~~power at the intermediate seed wavelengths $\lambda_{si} \neq \lambda_p$ into said pump delivery fiber.

20. (original) The method as claimed in claim 14, further comprising selecting the primary pump wavelength λ_0 and the number and position of the intermediate seed wavelengths $\lambda_{si} \neq \lambda_p$ specifically so as to avoid the water absorption peak in the pump delivery fiber.

21. (currently amended) The system as claimed in claim 3, wherein at least one of the $\lambda_{s1} \ldots \lambda_{sn}$ are selected to ~~flatten~~control the profile of the distributed Raman gain experienced by the signals due to the power at the $\lambda_{s1} \ldots \lambda_{sn}$ present in the signal carrying fiber, so as to limit the distributed Raman gain experienced by the signals to be below a maximum tolerable gain at which multi-path interference (MPI) transmission penalties due to double Rayleigh signal scattering would arise and thus make a greater portion of the transmission band accessible for signal transmission.